



IFWO

RAW SEQUENCE LISTING

DATE: 07/23/2004

PATENT APPLICATION: US/10/647,268

TIME: 16:47:20

Input Set : A:\Oosumi.ST25.txt

Output Set: N:\CRF4\07232004\J647268.raw

3 <110> APPLICANT: Oosumi et al., Teruko
 5 <120> TITLE OF INVENTION: Solanum Bulbocastanum Late Blight Resistance Gene and Use
 Thereof

7 <130> FILE REFERENCE: 0155.02

C--> 9 <140> CURRENT APPLICATION NUMBER: US/10/647,268

C--> 9 <141> CURRENT FILING DATE: 2003-08-20

9 <150> PRIOR APPLICATION NUMBER: 60/407,100

10 <151> PRIOR FILING DATE: 2002-08-29

12 <160> NUMBER OF SEQ ID NOS: 10

14 <170> SOFTWARE: PatentIn version 3.2

16 <210> SEQ ID NO: 1

17 <211> LENGTH: 3193

18 <212> TYPE: DNA

19 <213> ORGANISM: Solanum bulbocastanum

22 <220> FEATURE:

23 <221> NAME/KEY: CDS

24 <222> LOCATION: (52)..(3018)

26 <400> SEQUENCE: 1

ENTERED

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28                                     Met Ala
29                                     1
31 gaa gct ttc ctt caa gtt ctg tta gac aat ctg act tgt ttc atc caa      105
32 Glu Ala Phe Leu Gln Val Leu Leu Asp Asn Leu Thr Cys Phe Ile Gln
33      5                               10                               15
35 ggg gaa ctt gga ttg att ctt ggt ttt aag gat gag ttc gaa aag ctt      153
36 Gly Glu Leu Gly Leu Ile Leu Gly Phe Lys Asp Glu Phe Glu Lys Leu
37      20                               25                               30
39 caa agc acg ttt act aca atc caa gct gtg cta gaa gat gct cag aag      201
40 Gln Ser Thr Phe Thr Thr Ile Gln Ala Val Leu Glu Asp Ala Gln Lys
41 35                               40                               45                               50
43 aag caa ttg aag gac aag gca ata gaa aat tgg ttg cag aaa ctc aat      249
44 Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu Gln Lys Leu Asn
45      55                               60                               65
47 gct gct gca tat gag gct gat gac atc ttg gac gaa tgt aaa act gag      297
48 Ala Ala Ala Tyr Glu Ala Asp Asp Ile Leu Asp Glu Cys Lys Thr Glu
49      70                               75                               80
51 gca cca att aga cag aag aag aac aaa tat ggg tgt tat cat cca aac      345
52 Ala Pro Ile Arg Gln Lys Lys Asn Lys Tyr Gly Cys Tyr His Pro Asn
53      85                               90                               95
55 gtt atc act ttt cgt cac aag att ggg aaa agg atg aaa aag att atg      393
56 Val Ile Thr Phe Arg His Lys Ile Gly Lys Arg Met Lys Lys Ile Met
57      100                              105                              110
59 gag aaa cta gat gta att gca gcg gaa cga att aag ttt cat ttg gat      441
60 Glu Lys Leu Asp Val Ile Ala Ala Glu Arg Ile Lys Phe His Leu Asp

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| 64 | Glu | Arg | Thr | Ile | Glu | Arg | Gln | Val |
| 65 | | | | | | | | |
| 67 | ttg | aat | gaa | cca | ggt | tat | gga | aga |
| 68 | Leu | Asn | Glu | Pro | Gln | Val | Tyr | Gly |
| 69 | | | | | | | | |
| 71 | gtg | aaa | atc | ctg | ata | aac | aat | ggt |
| 72 | Val | Lys | Ile | Leu | Ile | Asn | Asn | Val |
| 73 | | | | | | | | |
| 75 | ctc | cca | ata | ctt | ggt | atg | ggg | gga |
| 76 | Leu | Pro | Ile | Leu | Gly | Met | Gly | Gly |
| 77 | | | | | | | | |
| 79 | atg | gtc | ttc | aat | gat | cag | aga | gta |
| 80 | Met | Val | Phe | Asn | Asp | Gln | Arg | Val |
| 81 | 195 | | | | | | | |
| 83 | tgg | att | tgt | gtc | tgc | gaa | gat | ttt |
| 84 | Trp | Ile | Cys | Val | Ser | Glu | Asp | Phe |
| 85 | | | | | | | | |
| 87 | att | gta | gaa | tct | att | gaa | gaa | aag |
| 88 | Ile | Val | Glu | Ser | Ile | Glu | Glu | Lys |
| 89 | | | | | | | | |
| 91 | cca | ctt | caa | aag | aag | ctt | cgg | gac |
| 92 | Pro | Leu | Gln | Lys | Lys | Leu | Arg | Asp |
| 93 | | | | | | | | |
| 95 | ctc | gtc | tta | gat | gat | ggt | tgg | aat |
| 96 | Leu | Val | Leu | Asp | Asp | Val | Trp | Asn |
| 97 | | | | | | | | |
| 99 | tta | aga | caa | gtc | ttg | aag | ggt | gga |
| 100 | Leu | Arg | Gln | Val | Leu | Lys | Val | Gly |
| 101 | 275 | | | | | | | |
| 103 | act | act | cgt | ctt | gaa | aag | ggt | gga |
| 104 | Thr | Thr | Arg | Leu | Glu | Lys | Val | Gly |
| 105 | | | | | | | | |
| 107 | tat | gaa | ttg | tca | aat | ttg | tct | caa |
| 108 | Tyr | Glu | Leu | Ser | Asn | Leu | Ser | Gln |
| 109 | | | | | | | | |
| 111 | caa | cgt | gca | ttt | ggg | cac | caa | gaa |
| 112 | Gln | Arg | Ala | Phe | Gly | His | Gln | Glu |
| 113 | | | | | | | | |
| 115 | atc | gga | aag | gag | att | gtg | aaa | aaa |
| 116 | Ile | Gly | Lys | Glu | Ile | Val | Lys | Lys |
| 117 | | | | | | | | |
| 119 | aaa | act | ctt | gga | ggt | att | ttg | cgc |
| 120 | Lys | Thr | Leu | Gly | Gly | Ile | Leu | Arg |
| 121 | 355 | | | | | | | |
| 123 | gaa | cat | gtg | aga | gat | agt | gag | att |
| 124 | Glu | His | Val | Arg | Asp | Ser | Glu | Ile |
| 125 | | | | | | | | |

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| 127 | tct | att | ctg | cct | gcc | ctg | aga | ctt | agt | tac | cat | cac | ctt | cca | ctt | gat | 1257 |
| 128 | Ser | Ile | Leu | Pro | Ala | Leu | Arg | Leu | Ser | Tyr | His | His | Leu | Pro | Leu | Asp | |
| 129 | | | | 390 | | | | | 395 | | | | | 400 | | | |
| 131 | ttg | aga | caa | tgc | ttt | aca | tat | tgt | gca | gta | ttc | cca | aag | gat | acc | gaa | 1305 |
| 132 | Leu | Arg | Gln | Cys | Phe | Thr | Tyr | Cys | Ala | Val | Phe | Pro | Lys | Asp | Thr | Glu | |
| 133 | | | 405 | | | | | 410 | | | | | 415 | | | | |
| 135 | atg | gaa | aag | gga | aat | cta | atc | tct | ctc | tgg | atg | gca | cat | ggg | ttt | att | 1353 |
| 136 | Met | Glu | Lys | Gly | Asn | Leu | Ile | Ser | Leu | Trp | Met | Ala | His | Gly | Phe | Ile | |
| 137 | | 420 | | | | | 425 | | | | | 430 | | | | | |
| 139 | tta | tcg | aaa | gga | aac | ttg | gag | cta | gag | aat | gta | ggg | aat | gaa | gta | tgg | 1401 |
| 140 | Leu | Ser | Lys | Gly | Asn | Leu | Glu | Leu | Glu | Asn | Val | Gly | Asn | Glu | Val | Trp | |
| 141 | 435 | | | | | 440 | | | | | 445 | | | | | 450 | |
| 143 | aat | gaa | tta | tac | ttg | agg | tct | ttc | ttc | caa | gag | att | gaa | gtt | aaa | tct | 1449 |
| 144 | Asn | Glu | Leu | Tyr | Leu | Arg | Ser | Phe | Phe | Gln | Glu | Ile | Glu | Val | Lys | Ser | |
| 145 | | | | 455 | | | | | 460 | | | | | 465 | | | |
| 147 | ggg | caa | act | tat | ttc | aag | atg | cat | gat | ctc | att | cat | gat | ctg | gca | aca | 1497 |
| 148 | Gly | Gln | Thr | Tyr | Phe | Lys | Met | His | Asp | Leu | Ile | His | Asp | Leu | Ala | Thr | |
| 149 | | | 470 | | | | | | 475 | | | | | 480 | | | |
| 151 | tct | cta | ttt | tcg | gca | agc | aca | tca | agc | agc | aat | atc | cga | gaa | ata | att | 1545 |
| 152 | Ser | Leu | Phe | Ser | Ala | Ser | Thr | Ser | Ser | Ser | Asn | Ile | Arg | Glu | Ile | Ile | |
| 153 | | | 485 | | | | | 490 | | | | | | 495 | | | |
| 155 | gta | gaa | aat | tac | ata | cat | atg | atg | tcc | att | ggg | ttc | act | aaa | gtg | gta | 1593 |
| 156 | Val | Glu | Asn | Tyr | Ile | His | Met | Met | Ser | Ile | Gly | Phe | Thr | Lys | Val | Val | |
| 157 | | 500 | | | | | 505 | | | | | 510 | | | | | |
| 159 | tct | tct | tac | tct | ctt | tcc | cac | ttg | cag | aag | ttt | gtc | tcg | ttg | agg | gtg | 1641 |
| 160 | Ser | Ser | Tyr | Ser | Leu | Ser | His | Leu | Gln | Lys | Phe | Val | Ser | Leu | Arg | Val | |
| 161 | 515 | | | | | 520 | | | | | 525 | | | | | 530 | |
| 163 | ctt | aat | cta | agt | gac | ata | aaa | ctt | aag | cag | tta | ccg | tct | tcc | att | gga | 1689 |
| 164 | Leu | Asn | Leu | Ser | Asp | Ile | Lys | Leu | Lys | Gln | Leu | Pro | Ser | Ser | Ile | Gly | |
| 165 | | | | 535 | | | | | 540 | | | | | 545 | | | |
| 167 | gat | cta | gta | cat | tta | aga | tac | cta | aac | ttg | tct | ggc | aat | act | agt | att | 1737 |
| 168 | Asp | Leu | Val | His | Leu | Arg | Tyr | Leu | Asn | Leu | Ser | Gly | Asn | Thr | Ser | Ile | |
| 169 | | | 550 | | | | | | 555 | | | | | 560 | | | |
| 171 | cgt | agt | ctt | cca | aac | cag | tta | tgc | aag | ctt | caa | aat | ctg | cag | act | ctt | 1785 |
| 172 | Arg | Ser | Leu | Pro | Asn | Gln | Leu | Cys | Lys | Leu | Gln | Asn | Leu | Gln | Thr | Leu | |
| 173 | | | 565 | | | | | 570 | | | | | | 575 | | | |
| 175 | gat | cta | cat | ggc | tgt | cat | tca | ctt | tgt | tgt | ttg | cca | aaa | gaa | aca | agc | 1833 |
| 176 | Asp | Leu | His | Gly | Cys | His | Ser | Leu | Cys | Cys | Leu | Pro | Lys | Glu | Thr | Ser | |
| 177 | | 580 | | | | | 585 | | | | | 590 | | | | | |
| 179 | aaa | ctt | ggg | agt | ctt | cga | aat | ctt | tta | ctt | gat | ggg | tgc | tat | gga | ttg | 1881 |
| 180 | Lys | Leu | Gly | Ser | Leu | Arg | Asn | Leu | Leu | Leu | Asp | Gly | Cys | Tyr | Gly | Leu | |
| 181 | 595 | | | | | 600 | | | | | 605 | | | | | 610 | |
| 183 | act | tgt | atg | cca | cca | agg | ata | gga | tct | ttg | aca | tgc | ctt | aag | act | cta | 1929 |
| 184 | Thr | Cys | Met | Pro | Pro | Arg | Ile | Gly | Ser | Leu | Thr | Cys | Leu | Lys | Thr | Leu | |
| 185 | | | | 615 | | | | | 620 | | | | | 625 | | | |
| 187 | agt | aga | ttt | gtg | gtg | gga | att | cag | aag | aaa | agt | tgt | caa | ctt | ggg | gaa | 1977 |
| 188 | Ser | Arg | Phe | Val | Val | Gly | Ile | Gln | Lys | Lys | Ser | Cys | Gln | Leu | Gly | Glu | |
| 189 | | | 630 | | | | | 635 | | | | | | 640 | | | |
| 191 | tta | cga | aac | ctg | aat | ctc | tat | ggc | tca | att | gaa | atc | acg | cat | ctt | gag | 2025 |

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| 193 | | | 645 | | | | | 650 | | | | | 655 | | | | |
| 195 | aga | gtg | aag | aat | gat | atg | gat | gca | aaa | gaa | gcc | aat | tta | tct | gca | aaa | 2073 |
| 196 | Arg | Val | Lys | Asn | Asp | Met | Asp | Ala | Lys | Glu | Ala | Asn | Leu | Ser | Ala | Lys | |
| 197 | | | 660 | | | | | 665 | | | | | 670 | | | | |
| 199 | gaa | aat | ctg | cat | tct | tta | agc | atg | aaa | tgg | gat | gac | gat | gaa | cgt | cca | 2121 |
| 200 | Glu | Asn | Leu | His | Ser | Leu | Ser | Met | Lys | Trp | Asp | Asp | Asp | Glu | Arg | Pro | |
| 201 | 675 | | | | | 680 | | | | | 685 | | | | | 690 | |
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| 204 | Arg | Ile | Tyr | Glu | Ser | Glu | Lys | Val | Glu | Val | Leu | Glu | Ala | Leu | Lys | Pro | |
| 205 | | | | | 695 | | | | | 700 | | | | | 705 | | |
| 207 | cac | tcc | aat | ctg | act | tgt | tta | aca | atc | agg | ggc | ttc | aga | gga | atc | cgt | 2217 |
| 208 | His | Ser | Asn | Leu | Thr | Cys | Leu | Thr | Ile | Arg | Gly | Phe | Arg | Gly | Ile | Arg | |
| 209 | | | | 710 | | | | | 715 | | | | 720 | | | | |
| 211 | ctc | cca | gac | tgg | atg | aat | cac | tca | gtt | ttg | aaa | aat | gtt | gtc | tct | att | 2265 |
| 212 | Leu | Pro | Asp | Trp | Met | Asn | His | Ser | Val | Leu | Lys | Asn | Val | Val | Ser | Ile | |
| 213 | | | 725 | | | | | 730 | | | | | 735 | | | | |
| 215 | gaa | atc | atc | agt | tgc | aaa | aac | tgc | tca | tgc | tta | cca | ccc | ttt | ggt | gag | 2313 |
| 216 | Glu | Ile | Ile | Ser | Cys | Lys | Asn | Cys | Ser | Cys | Leu | Pro | Pro | Phe | Gly | Glu | |
| 217 | | 740 | | | | 745 | | | | | | 750 | | | | | |
| 219 | ctg | cct | tgt | cta | aaa | agt | cta | gag | ttg | tgg | agg | ggg | tct | gcg | gaa | gtg | 2361 |
| 220 | Leu | Pro | Cys | Leu | Lys | Ser | Leu | Glu | Leu | Trp | Arg | Gly | Ser | Ala | Glu | Val | |
| 221 | 755 | | | | 760 | | | | | 765 | | | | | 770 | | |
| 223 | gag | tat | gtt | gat | tct | gga | ttc | cct | aca | aga | aga | agg | ttt | cca | tct | ctg | 2409 |
| 224 | Glu | Tyr | Val | Asp | Ser | Gly | Phe | Pro | Thr | Arg | Arg | Arg | Phe | Pro | Ser | Leu | |
| 225 | | | | 775 | | | | | 780 | | | | 785 | | | | |
| 227 | aga | aaa | ctt | aat | ata | cgc | gaa | ttt | ggt | aat | ctg | aaa | gga | ttg | ctg | aaa | 2457 |
| 228 | Arg | Lys | Leu | Asn | Ile | Arg | Glu | Phe | Gly | Asn | Leu | Lys | Gly | Leu | Leu | Lys | |
| 229 | | | | 790 | | | | | 795 | | | | 800 | | | | |
| 231 | aag | gaa | gga | gaa | gag | caa | tgc | cct | gtg | ctt | gaa | gag | ata | gag | att | aaa | 2505 |
| 232 | Lys | Glu | Gly | Glu | Glu | Gln | Cys | Pro | Val | Leu | Glu | Glu | Ile | Glu | Ile | Lys | |
| 233 | | | 805 | | | | | 810 | | | | | 815 | | | | |
| 235 | tgt | tgc | cct | atg | ttt | gtt | att | cca | acc | ctt | tct | tct | gtc | aag | aaa | ttg | 2553 |
| 236 | Cys | Cys | Pro | Met | Phe | Val | Ile | Pro | Thr | Leu | Ser | Ser | Val | Lys | Lys | Leu | |
| 237 | | 820 | | | | 825 | | | | | | 830 | | | | | |
| 239 | gta | gtt | agt | ggg | gac | aag | tca | gat | gca | ata | ggt | ttc | agt | tcc | ata | tct | 2601 |
| 240 | Val | Val | Ser | Gly | Asp | Lys | Ser | Asp | Ala | Ile | Gly | Phe | Ser | Ser | Ile | Ser | |
| 241 | 835 | | | | 840 | | | | | | 845 | | | | 850 | | |
| 243 | aat | ctc | atg | gct | ctt | act | tcc | ctc | caa | att | cgc | tat | aac | aaa | gaa | gat | 2649 |
| 244 | Asn | Leu | Met | Ala | Leu | Thr | Ser | Leu | Gln | Ile | Arg | Tyr | Asn | Lys | Glu | Asp | |
| 245 | | | | 855 | | | | | 860 | | | | 865 | | | | |
| 247 | gct | tca | ctc | cca | gaa | gag | atg | ttc | aaa | agc | ctt | gca | aat | ctc | aaa | tac | 2697 |
| 248 | Ala | Ser | Leu | Pro | Glu | Glu | Met | Phe | Lys | Ser | Leu | Ala | Asn | Leu | Lys | Tyr | |
| 249 | | | | 870 | | | | | 875 | | | | 880 | | | | |
| 251 | ttg | aat | atc | tct | ttt | tac | ttc | aat | ctt | aaa | gag | ctg | cct | acc | agc | ctg | 2745 |
| 252 | Leu | Asn | Ile | Ser | Phe | Tyr | Phe | Asn | Leu | Lys | Glu | Leu | Pro | Thr | Ser | Leu | |
| 253 | | | 885 | | | | | 890 | | | | | 895 | | | | |
| 255 | gct | agt | ctc | aat | gct | ttg | aag | cat | ctg | gaa | att | cat | agt | tgt | tat | gca | 2793 |
| 256 | Ala | Ser | Leu | Asn | Ala | Leu | Lys | His | Leu | Glu | Ile | His | Ser | Cys | Tyr | Ala | |

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260 Leu Glu Ser Leu Pro Glu Glu Gly Val Lys Gly Leu Ile Ser Leu Thr
261 915                      920                      925                      930
263 cag tta tcc ata aca tac tgt gaa atg cta caa tgt tta ccg gag gga      2889
264 Gln Leu Ser Ile Thr Tyr Cys Glu Met Leu Gln Cys Leu Pro Glu Gly
265                      935                      940                      945
267 ttg cag cac cta aca gcc ctc aca aat tta tca gtt gag ttt tgt cca      2937
268 Leu Gln His Leu Thr Ala Leu Thr Asn Leu Ser Val Glu Phe Cys Pro
269                      950                      955                      960
271 aca ctg gcc aag cgg tgt gag aag gga ata gga gaa gac tgg tac aaa      2985
272 Thr Leu Ala Lys Arg Cys Glu Lys Gly Ile Gly Glu Asp Trp Tyr Lys
273                      965                      970                      975
275 att gct cac att cct cgt gtg ttt att tat tag tattcccaat tagatgtaat      3038
276 Ile Ala His Ile Pro Arg Val Phe Ile Tyr
277      980                      985
279 tttctgattt tcttttggaa acaaatcaac tatttgtaag atctatttgt attatacttg      3098
281 atttttcttg ggtctgtaac aataaatatt tgaaattttt catattaaga ttcagaatta      3158
283 gtcttatagt caaaaaaaaaa aaaaaaaaaa aaaaa      3193
286 <210> SEQ ID NO: 2
287 <211> LENGTH: 988
288 <212> TYPE: PRT
289 <213> ORGANISM: Solanum bulbocastanum
291 <400> SEQUENCE: 2
293 Met Ala Glu Ala Phe Leu Gln Val Leu Leu Asp Asn Leu Thr Cys Phe
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297 Ile Gln Gly Glu Leu Gly Leu Ile Leu Gly Phe Lys Asp Glu Phe Glu
298                      20                      25                      30
301 Lys Leu Gln Ser Thr Phe Thr Thr Ile Gln Ala Val Leu Glu Asp Ala
302                      35                      40                      45
305 Gln Lys Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu Gln Lys
306                      50                      55                      60
309 Leu Asn Ala Ala Ala Tyr Glu Ala Asp Asp Ile Leu Asp Glu Cys Lys
310 65                      70                      75                      80
313 Thr Glu Ala Pro Ile Arg Gln Lys Lys Asn Lys Tyr Gly Cys Tyr His
314                      85                      90                      95
317 Pro Asn Val Ile Thr Phe Arg His Lys Ile Gly Lys Arg Met Lys Lys
318                      100                      105                      110
321 Ile Met Glu Lys Leu Asp Val Ile Ala Ala Glu Arg Ile Lys Phe His
322                      115                      120                      125
325 Leu Asp Glu Arg Thr Ile Glu Arg Gln Val Ala Thr Arg Gln Thr Gly
326                      130                      135                      140
329 Phe Val Leu Asn Glu Pro Gln Val Tyr Gly Arg Asp Lys Glu Lys Asp
330 145                      150                      155                      160
333 Glu Ile Val Lys Ile Leu Ile Asn Asn Val Ser Asn Ala Gln Thr Leu
334                      165                      170                      175
337 Pro Val Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu
338                      180                      185                      190
341 Ala Gln Met Val Phe Asn Asp Gln Arg Val Ile Glu His Phe His Pro

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VERIFICATION SUMMARY

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Input Set : A:\Oosumi.ST25.txt

Output Set: N:\CRF4\07232004\J647268.raw

L:9 M:270 C: Current Application Number differs, Replaced Current Application No
L:9 M:271 C: Current Filing Date differs, Replaced Current Filing Date
L:614 M:361 W: Invalid Split Codon, Sequence data for SEQ ID#: 3

STATISTICS SUMMARY

PATENT APPLICATION: US/10/647,268

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Output Set: N:\CRF4\07232004\J647268.raw

Application Serial Number: US/10/647,268

Alpha or Numeric or Xml: Numeric

Application Class:

Application File Date: 08-20-2003

Art Unit: IFWO

Software Application: PatentIN3.2

Total Number of Sequences: 10

Total Nucleotides: 18385

Total Amino Acids: 4967

Number of Errors: 0

Number of Warnings: 1

Number of Corrections: 2

MESSAGE SUMMARY

270 C: 1 (Current Application Number differs)

271 C: 1 (Current Filing Date differs)

361 W: 1 (Invalid Split Codon)